Hints on Fitting :: AND Adjusting THE ZENITH Carburetter

1915.

HINTS ON FITTING & ADJUSTING THE ZENITH CARBURETTER

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IMPORTANT POINTS.

The correct working of the ZENITH Carburetter can only be assured when it is **not tampered with in any way**; the jets must not be reamered out or hammered up, and the hints which are given in this booklet must be **strictly adhered to**.

A ZENITH Carburetter, properly fitted, can be tuned up in a few hours, but when badly fitted the tuning up becomes impossible.

The numbers stamped under the Jets and Compensators correspond to the bore of these jets in hundredths of millimetres.

All the jets are very carefully gauged to give a certain debit in a stated time, and therefore two jets bearing the same number give exactly the same debit. It is thus essential that they should not be altered under any circumstances.

For the names of the different parts of the Carburetter please refer to the sectional drawings on pp. 12 and 13.

NATURE OF THE FUEL USED.

The ZENITH Carburetter is supplied already adjusted for use with petrol spirits of densities between 700° and 750°.

Carburetters thus adjusted may therefore be used with Benzole without altering the setting. The level, however, will be lower in the Carburetter owing to the increase of density, but this difference in level is necessary and precludes, as a rule, any modification of the jets. Never weight the float or make alterations to the level when using heavy spirits.

It is of the **utmost importance** when using comparatively high density spirit, such as Benzole, to install a very efficient heating apparatus in order to properly vapourise the heavier fuel.

With the ZENITH Carburetter it is impossible to use paraffin or pure alcohol.

FITTING THE CARBURETTER.

POSITION.—The vertical type of Zenith Carburetter must be placed in an accessible position in order to be able to quickly take out the jets and unscrew the petrol union.

A space of a few inches should therefore be left below the Carburetter, which, however, should be placed sufficiently low in order to ensure a plentiful head of petrol, even when the car is on a steep hill. As a rule, the bottom of the petrol tank should be at least 8 inches above the top of the float chamber.

For cars on which the tank is placed under the seat, it is of course necessary to place the Carburetter fairly low down, in which case the shield comes very close to the bottom of the Carburetter. (Example: Delaunay-Belleville Cars). In such cases it is necessary to remove the induction pipe with the Carburetter.

It is always preferable to place the float chamber towards the front of the car so that when going down hill the petrol does not run out of the jets.

These precautions are of course not necessary for the **horizontal** type of Carburetters, as these can only be fitted in one position, and that is against the inlet port on the cylinder.

Their accessibility is therefore assured, but on the other hand they can only be fitted to cars where the petrol is supplied under pressure, or where the tank is sufficiently high on the dash. These horizontal Carburetters are only suitable for monobloc engines having one inlet port, with the valves on the opposite side. If an inlet pipe is used, the vertical Carburetter is more suitable, and this type only must be adopted.

CONTROL.—The control, being worked by the accelerator pedal or by a lever on the steering wheel, should be as direct and rigid as possible.

It should be arranged in such a manner that the complete movement of the accelerator or hand lever corresponds to the complete movement of the throttle lever on the Carburetter.

Stiffness must be avoided, so that when acceleration is effected by the pedal and the latter is then released, the throttle in the Carburetter will return to its former position.

In addition to the accelerator pedal spring, it is desirable to fit another small spring on the throttle lever itself in order to take up any slackness or play in the connections.

The 1915 type Zenith Carburetters are fitted with adjustable throttle levers (Figs. 1, 2 and 3) which enables them to be set in any position.

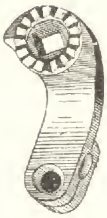


Fig. 1.

Fig. 2.

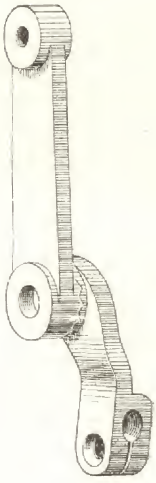


Fig. 3.

CONCERNING THE INLET PIPE.

The shape, size and disposition of the inlet pipe are most important factors to be taken into consideration when fitting a Zenith Carburetter.

The internal diameter of the horizontal branch leading to the cylinder ports can be of the same size as the ports themselves, but the vertical portion should be tapered from a few millimetres smaller than the outlet of the Carburetter to the same size as the branch.

Fig. 4 shows a sketch of a well-designed inlet pipe.

We have found the following sizes of piping (internal dimensions) to be the most suitable for the various Carburetters of our make.

Plan of suitable induction pipe.

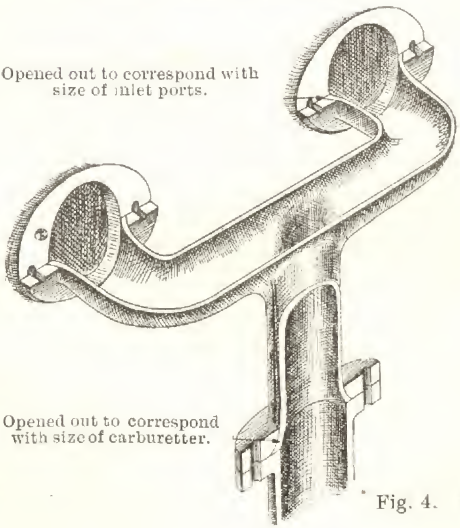


Fig. 4.

No.	22	Carburetter	...	Internal	diameter	of	piping	18	to	20	m/m.
,,	26	,,	...	,,	,,	,,	,,	22	,,	24	,,
,,	30	,,	...	,,	,,	,,	,,	25	,,	28	,,
,,	36	,,	...	,,	,,	,,	,,	30	,,	33	,,
,,	42	,,	...	,,	,,	,,	,,	35	,,	38	,,
,,	48	,,	...	,,	,,	,,	,,	40	,,	44	,,
,,	55	,,	...	,,	,,	,,	,,	45	,,	50	,,
,,	65	,,	...	,,	,,	,,	,,	55	,,	60	,,

Sudden changes in the speed of the gas cause a considerable loss of charge, and it is therefore necessary that internal variations of size should be progressive.

Avoid sharp bends wherever possible.

It was formerly thought necessary to have pipes of equal length to go from the Carburetter to the different cylinder ports.

Experience has, however, demonstrated that pipes of different lengths had very little influence on the filling of the cylinders, but that **bends** were the cause of a considerable loss of charge.

We give below (Figs. 6 and 7) two examples of well designed piping, and Fig. 5 shows a pipe which, although serving the same purpose, gives inferior results.

Defective induction pipe

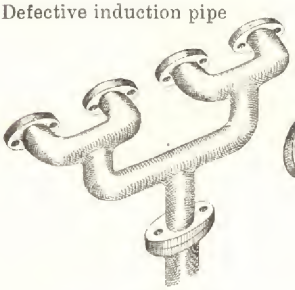


Fig. 5.

Efficient induction pipes

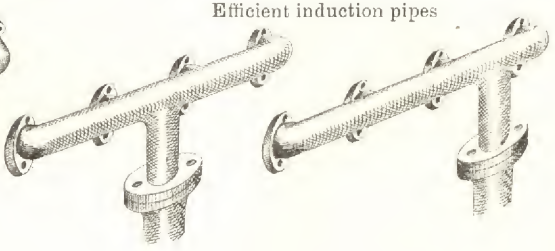


Fig. 6. Fig. 7.

Dips and pockets in which petrol vapour can condense should also be avoided (Fig. 8).

Defective induction pipe showing dip.

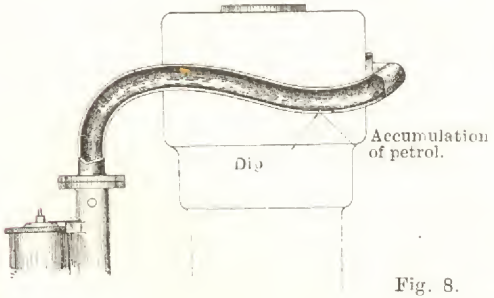


Fig. 8.

If the piping is to branch off in order to distribute the mixture to several cylinders, this branching should occur at not less than 3 or 4 inches from the Carburetter.

Drawn copper inlet pipes are much better than cast ones, as with the latter the internal surface is rough, which restricts to a certain extent the free flow of the gas.

In order to facilitate the task of making induction pipes we have introduced a series of flanges, bends, T pieces, etc., which will render the fitting of the vertical type of Carburetters quite easy.

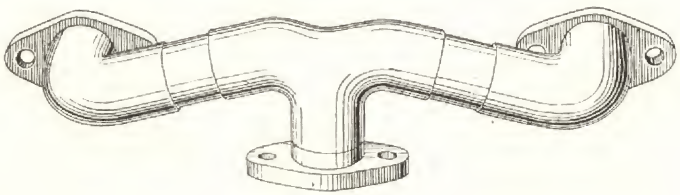


Fig. 9.

Write for our Catalogue " Fitting Accessories," free on application.

HEATING.

The **horizontal** type of Carburetter does away with the need of a heating device, but it can only be fitted where there is a certain length of induction pipe inside the cylinder casting, which is heated by the water circulation.

In order to ensure the perfect working of the **vertical** Carburetters A B C or D E F, which are still used in greater numbers than the horizontal type, **the air entering the Carburetter**, or better still **the mixture itself, must be heated.**

It is impossible to correctly tune up a vertical Carburetter which does not possess one or the other of these heating systems, and the majority of the difficulties encountered by our customers in tuning up their engines are caused by the absence of, or the inadequacy of, the heating device.

These difficulties are caused by the condensation of the petrol vapour in the induction pipe, and **it is indispensable** that this condensation should be avoided in order to be able to **regulate the slow-running**, ensure a **quick pick up**, and obtain an **even running of the engine.**

This is a very important point, and we wish to particularly bring it to our customers' notice.

There are three methods of heating :—

1.— By means of the water circulation.
2.— ,, ,, ,, exhaust gases.
3.— ,, ,, hot air taken into the Carburetter.

HEATING BY HOT WATER.

This method of heating can only be adopted when the engine is fitted with a forced water circulation. Fig. 10 shows how this system can be fitted.

Plan showing heating by hot water jacket.
Water jacket brazed on to induction pipe.

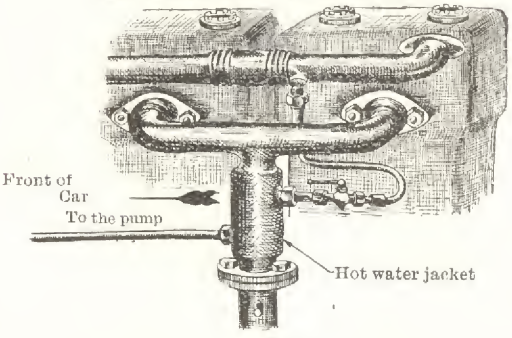


Fig. 10.

The induction pipe is surrounded to a certain height by a jacket through which the water circulates. This jacket may be soldered or welded on to the pipe, but as this method is not always convenient, we make a special hot water jacket (Fig. 11), fuller particulars of which will be found on pages 13 and 14 of our "Fitting Accessories" catalogue.

The hot water jacket should be placed immediately above the Carburetter so as to completely vapourise the petrol when the engine is turning slowly.

The water used for the heating is generally taken as it leaves the cylinder casting. It is then passed through the hot water jacket and joins the main circulation just before the pump.

A tap is placed in each of the branch pipes to the hot water jacket, to enable the heat to be regulated, and also to allow the Carburetter to be dismounted without emptying the water circulation.

Plan showing heating by hot water jacket.
(Using our standard hot water jacket.)

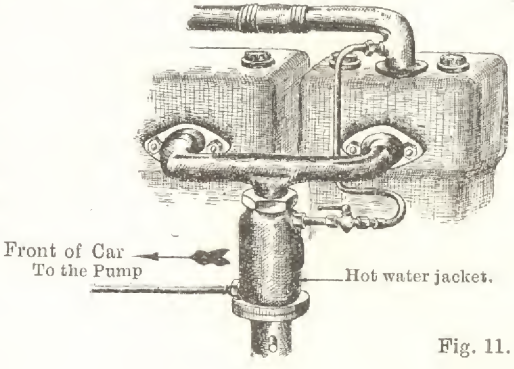


Fig. 11.

One of the great advantages of this system is to supply, one might say automatically, the right amount of heat just when it is required.

Whilst the engine is running light and turning over slowly and at low speeds, the gas travels slowly in the piping and the heating is excellent.

On the other hand, when the engine is running fast, the gas, travelling rapidly, has less time to get hot and it is just at this period that the heating is of the least importance.

HEATING BY EXHAUST GASES.

This method is practically the same as by means of the hot water. It consists of passing a certain amount of the exhaust gases around the induction pipe inside a jacket (Fig. 12).

Plan showing heating by exhaust gases.
(Using our standard heater).

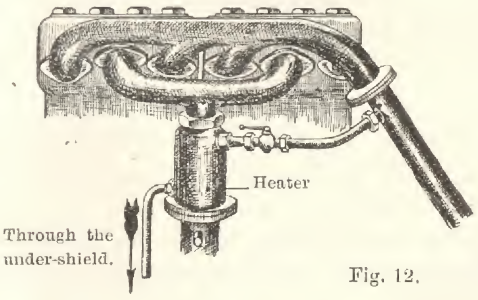


Fig. 12.

The exhaust pipe should be tapped at the hottest part, *i.e.*, just after it leaves the cylinders and the pipe used for taking the gas from the exhaust pipe to the jacket should be about 10 m/m to 12 m/m internal diameter. It should be as short as possible in order to avoid loss of heat by radiation and conduction, and it should penetrate into the exhaust pipe in such a manner that its orifice be pointed against the stream of gases (Fig. 13), *i.e.*, away from the silencer.

Method of taking gas from exhaust pipe.

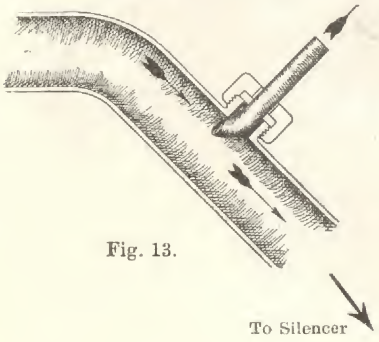


Fig. 13.

The other pipe leading from the jacket, which should be of the same diameter as the one leading to it, should pass below the car and be of such length as to deaden the noise.

This method of heating is not so satisfactory as the previous one and should only be used when heating by means of water is impossible.

HEATING BY HOT AIR ENTERING THE CARBURETTER.

Plan showing heating by hot air taken from valve chamber.

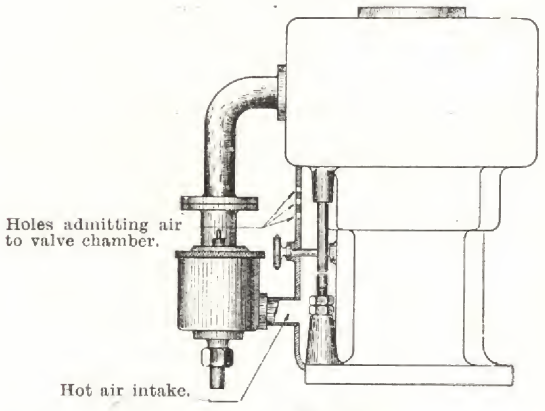


Fig. 14.

This system, which should only be used when the water circulation is by thermo-syphon, consists of leading into the Carburetter air that has been warmed by contact with the exhaust pipe. This is effected by placing a muff round the exhaust pipe, from which muff a pipe is taken to one of the air ports on the Carburetter.

In certain cases the hot air may be taken from the enclosed space around the valves as shown in Fig. 14, but this method is not very efficient and should only be adopted when it is impossible to employ any other system.

Fig. 15 shows the best method of heating by means of hot air, and we can supply all the necessary parts for this fitting.

Avoid using too long a pipe and see that the air has not to descend in order to get to the Carburetter.

To regulate the quantity of hot air, a revolving sleeve is placed on the pipe just before it reaches the Carburetter. This sleeve has slots cut in it which correspond to slots cut in the pipe, thus enabling cold air to be admitted at will.

Plan showing heating by muff on exhaust pipe.

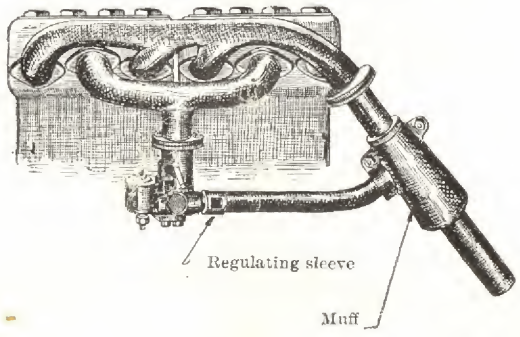
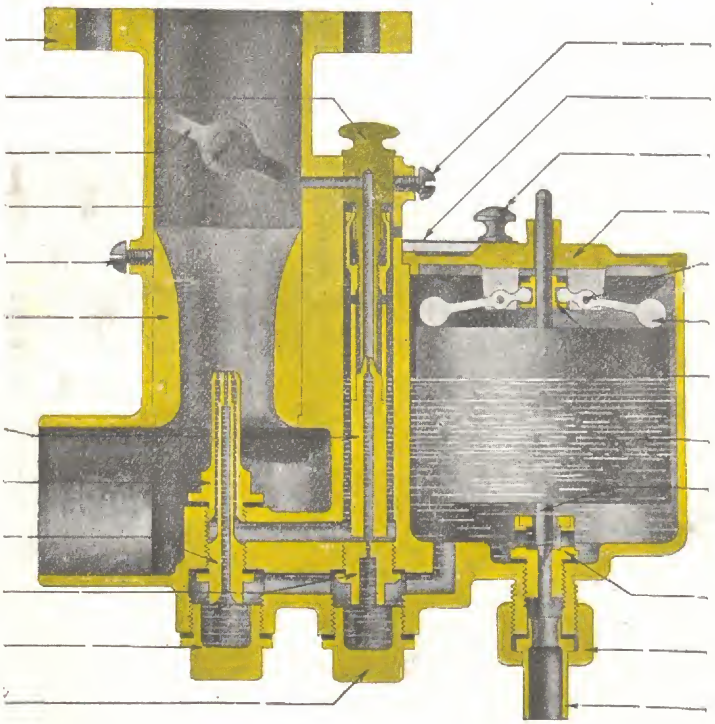
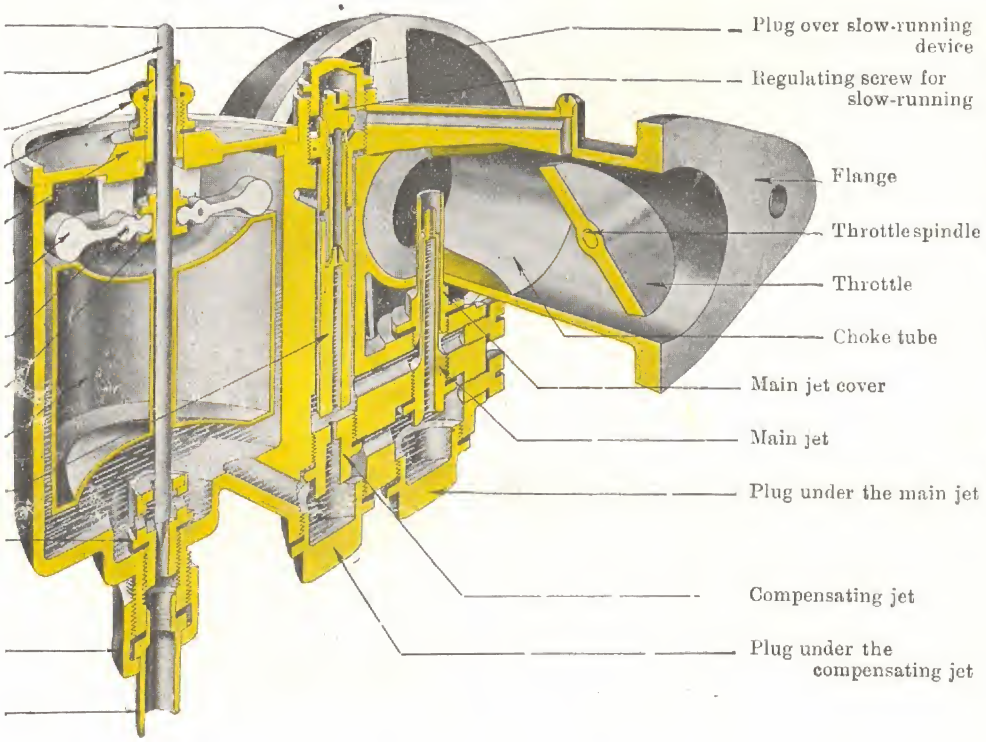


Fig. 15.

Section of Vertical Carburetter.



Section of Horizontal Carburetter.



FIXING THE CARBURETTER AND FLANGES.

If the inlet piping is very rigid the Carburetter can be suspended from it by means of two bolts.

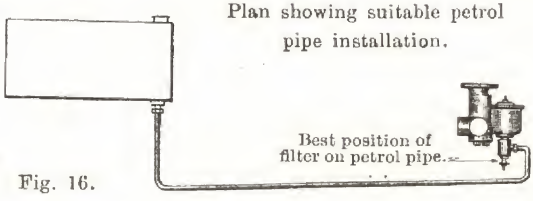
However, if the induction pipe is neither very short nor very rigid, and the Carburetter has a tendency to shake about, no matter how little, then it must be supported in some way. This support could be fixed at one end by one of the bolts passing through the flange, and at the other end by one of the bolts on the engine or frame.

The flange washer, of fibre, asbestos, etc., should be of even thickness so that the flanges fit snugly together and allow no air to pass in between them. The same remark applies to all joints in the piping.

THE PETROL PIPE.

It is absolutely necessary to place a filter somewhere on the petrol pipe, in order to prevent the jets becoming stopped up. The best system is to place the filter on the Carburetter itself.

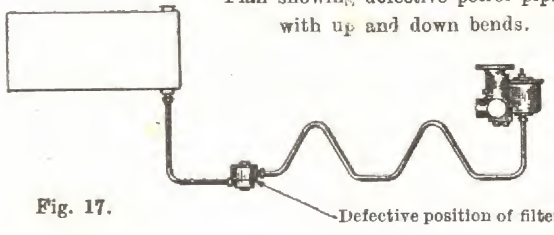
If the filter be placed on the petrol pipe, then the pipe between the filter and the Carburetter should have a gentle rise.



Plan showing suitable petrol pipe installation.

Fig. 16.

The whole of the piping should form a V, *i.e.*, there should be no ups and downs, neither should it contain any sharp bends, pockets, etc., which would be likely to cause an air lock. The explanation of this is given in Figs. 16 and 17.



Plan showing defective petrol piping with up and down bends.

Fig. 17.

The petrol pipe should not touch anything hot (exhaust pipe or silencer), as under the action of heat the petrol vapourises and causes a gas-lock in the pipe.

The petrol pipe should not touch any part of the chassis other than where absolutely necessary, as the constant rubbing against anything hard is liable to wear a hole in the pipe. This is frequently the cause of a heavy petrol consumption.

TAKING DOWN THE ZENITH CARBURETTER.

THE FLOAT CHAMBER.—In the **vertical** type of Carburetters pull back the spring button which holds the cover in place, and carefully lift off the latter together with the needle and balance weights. The edge of the cover is milled in order that a good grip may be obtained, but care should be taken to avoid bending the needle. After the cover is removed it is easy to take out the float by means of the needle, or a hooked piece of wire, which is placed down the centre hole.

In the **horizontal** type of Carburetters the centre knob is unscrewed one turn, when on turning the cover round a little it comes away quite easily.

THE CHOKE TUBE.—This is a cylindrical piece of metal placed in the body of the Carburetter, around the jets, to cause the rush of air necessary to form a good mixture.

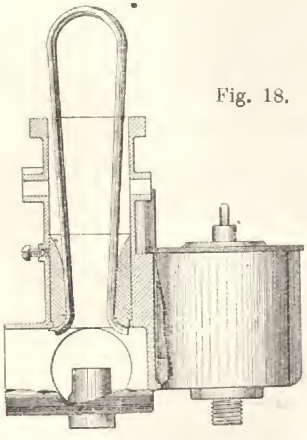


Fig. 18.

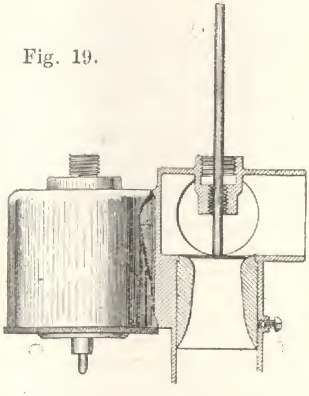


Fig. 19.

In the **vertical** type of Carburetters the throttle and spindle must be taken out before the choke tube can be removed To do this remove the set screw which fixes the throttle on the spindle, take the throttle between

the thumb and first finger and pull the spindle out. After this loosen the pressure screws holding the choke tube in place, and it will then generally come out quite easily by turning the Carburetter upside down.

If this is not the case, owing to the Carburetter or the choke tube having received a blow, it can be removed with an instrument, as shown in Fig. 18, or else unscrew the jet, and jet cover, as shown in Fig. 19, and place a metal washer, a halfpenny for example, against the choke tube, and then force it out with a thin rod as shown. Care should be taken so as not to damage the threads of the main jet and cover.

When replacing the choke tube **take great care to make sure that the narrowest part is downwards**, and that the groove around it rests on the ledge cut for that purpose in the body of the Carburetter (Fig. 20). Tighten the pressure screws to hold the choke tube in place, and then put back the spindle and throttle. It is important that the latter should be properly refitted, and when it is correctly replaced, the lower edge when shut should just cover the bye-pass hole, and the number stamped on the throttle should be uppermost.

Section showing exact position of choke tube in vertical carburetters.

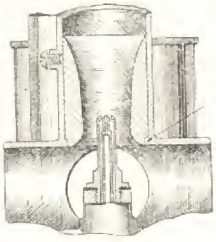


Fig. 20.

In the **horizontal** type of Carburetters it is very much easier to take out the choke tube. First unscrew the domed air-intake, take out the main jet (see below), and then unscrew the jet cover when the choke tube will come out with it.

The new choke tube is put in at the same time as the jet cover.

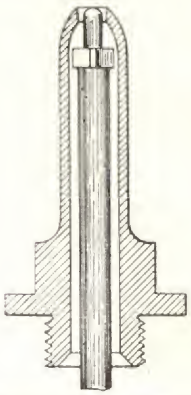
TAKING OUT THE JETS.—A Jet Key is sent out with each Carburetter for the purpose of taking out the jets.

The hexagonal nuts below the jets must first be removed by means of an ordinary spanner, when the jets can be unscrewed by the special jet key.

When replacing the jets make sure that they have a washer on them, and that it is well down on the shoulder.

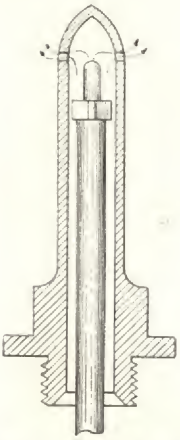
HOW OUR CARBURETTERS ARE FITTED UP.

Carburetters supplied by us are either fitted with the open main jet cover (Fig. 21) or the dome main jet cover (Fig. 22). The dome jet cover is used exclusively for 2-cylinder engines in which the suction stroke occurs at irregular intervals. In all other cases the Carburetter is fitted with an open jet cover.



Section of the open cap.

Fig. 21.



Section of closed cap.

Fig. 22.

Each Carburetter sent out is fitted with a main jet, compensator and choke tube best suited to the engine for which it is intended. The combination of these three parts constitutes the **setting** and this latter sometimes requires slight alteration after testing the car.

HOW TO WRITE FOR PARTICULARS *re* TUNING-UP, &c.

It is absolutely essential to give the following particulars :—

1. HP., make and year of car.
2. Number of cylinders.
3. Bore and stroke of same.
4. Number of Carburetter used (please mention all letters and figures stamped on the SIDE of the float chamber.)
5. The present setting (number on main jet, compensator and choke tube).
6. Whether a heating device is installed, if so, of which type.

Also please state any other particulars which are likely to help us when replying.

IMPORTANT NOTICE.—When the open jet cover is used the main jet is generally smaller than the compensator, but with the dome jet cover it is the opposite, the compensator being smaller than the main jet.

TUNING UP THE CARBURETTER.

The Zenith Carburetter, being absolutely automatic in principle, it is necessary, in order to obtain all the advantages it affords in respect of flexibility, power, economy, etc., that the Carburetter applied to any given engine should be one that is appropriate to the details of that engine. In other words the Carburetter should be adjusted carefully ONCE FOR ALL.

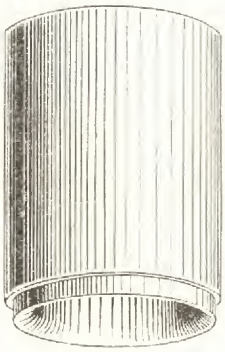


Fig. 23.

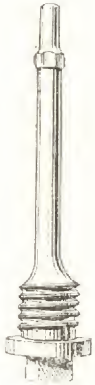


Fig. 24.

Fig. 25.

The Zenith Carburetter is adjusted by determining the correct sizes of the **Choke Tube** (Fig. 23), **Main Jet** (Fig. 24) and **Compensator** (Fig. 25).

The purpose of the **Choke Tube** is to obtain the correct velocity of air around the jets in order to get the best mixture at all speeds.

The **Main Jet** has most influence at high speeds.

The **Compensator**, which corrects the irregularities of the main jet, has the greatest influence at low speeds.

Besides these three parts, there is in the Zenith Carburetter a special device to regulate the slow running.

The Carburetter being properly fitted according to the instructions previously given and containing the **correct setting for the engine on which it is to be used,** the engine may now be STARTED UP.

For this, it is necessary to only open the throttle **a very little,** and at the first turn of the handle a sort of sucking noise should be heard indicating that the petrol is passing through the bye-pass properly. The engine will then start immediately.

It is sometimes necessary to slightly advance the ignition after leaving the engine running for a few minutes in order to get warmed up. The tuning up may then be started, *i.e.*, the determination of the correct sizes of the main jet, compensator and choke tube may be commenced.

In order to obtain the best results, the engine of course must be in perfect running order.

We mention below a few of the things that are likely to happen and the best way to correct these faults by altering the different parts.

1. CHOKE TUBE TOO BIG.—The choke tube is too large when the **picking up is bad**, or when it is impossible to obtain a sharp acceleration no matter what size of compensator is used.

The tests for "pick-up" should be made on the level. Let the car run at a good speed, then slow down slightly, after which press the accelerator down sharply as far as it will go. The car should then quickly pick up its previous speed without hesitation.

If, instead of accelerating, the engine stops, try larger compensators.

If, in spite of this the picking-up is not good, the choke tube is too large, in which case fit another 1 or 2 m/m smaller, and try again until the acceleration is perfect.

2. CHOKE TUBE TOO SMALL.—With too small a choke tube the pick-up is excellent, but the **speed attained on the level with the accelerator right down is insufficient.** A larger choke tube is then fitted, and the jets altered proportionately, when the tests are continued until the symptoms of too large a choke tube are noticed.

3. MAIN JET TOO LARGE.—To ascertain the correct size of main jet, the test is also made on the level at high speed.

A jet which is much too large causes **choking**, and the engine often runs jerkily and hunts. **The petrol consumption is also excessive.**

The jet that gives the **greatest speed on the level** is chosen. If two jets give an equal speed, choose the smaller on the score of economy.

4. MAIN JET TOO SMALL.—The main jet is too small when the car gets away badly and **popping-back occurs in the Carburetter when accelerating.** This popping-back occurs at irregular intervals, and the engine has no power and cannot drive the car at a high speed.

Fit larger jets until these explosions in the inlet pipe disappear, and then test until the right jet has been found, as indicated in Section 3.

The popping-back may also be caused by **air leaking into the induction pipe** through joints which are not air-tight, or to the valves not closing properly.

5. COMPENSATOR TOO LARGE.—As explained in our catalogue, in the description of the principle of the Zenith Carburetter, the compensator exerts most influence at low speeds.

The trials of different compensators should take place on an incline, with the engine driving the car at a speed it can scarcely maintain, say 300 to 500 r.p.m.

The compensator is too large when the engine at this speed runs with an irregular, jerky motion ; the hunting which takes place at high speed in the case of too large a main jet is found at low speeds with too large a compensator. The size of the compensator is decreased until all the cylinders fire evenly and the exhaust is quite regular.

As in the case of the main jet, if two compensators give equal results, choose the smaller on the score of economy.

The compensator plays a great part in the picking-up, but when the size of the former is determined according to the above method, it is generally suitable for an excellent acceleration.

6. COMPENSATOR TOO SMALL.—The tests taking place as for No. 5, the engine misses now and again, the transmission receives thumps, and the engine finally stops. In this case fit a larger compensator until the engine runs regularly.

REGULATING THE SLOW-RUNNING.

Several systems of slow-running adjustment have been applied to the Zenith Carburetter since its inception, and we give below the method of regulating each of them.

It is important to note that the slow-running which apparently is only a question of personal satisfaction, has a considerable effect on the picking-up. Too much petrol for slow-running causes **choking** and **hesitation in the pick-up.** A want of petrol, on the other hand, causes a loss of power and missing at the same time. It is therefore necessary to regulate the slow-running as carefully as possible.

We hasten to point out that there are many factors quite apart from the Carburetter which have a great influence on the slow-running (we mean slow-running when the engine is out of gear and the car is stationary). These factors are as follows :—

1. Joints not air-tight.
2. Valve guides worn.
3. Valves not tight.
4. Flywheel not heavy enough.
5. Ignition too much advanced.

These points must always be taken into consideration, and one should not blame the Carburetter only if the slow-running is not satisfactory.

The different methods of regulating the various slow-running devices are shown as follows :—

SLOW-RUNNING DEVICE, 1911 (Models A, B and C, Fig. 26). The slow-running was determined by a fixed pipe drawing petrol from the well at a given height above the compensator. The slow-running device in this Carburetter is not adjustable.

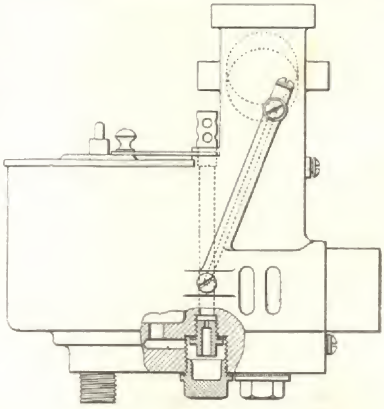


Fig. 26.

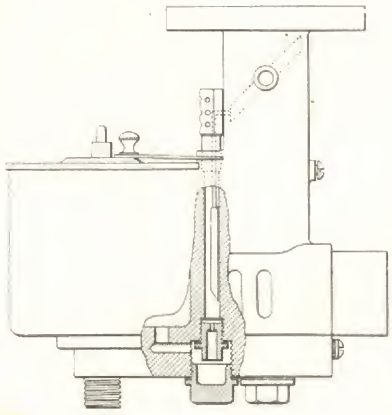


Fig. 27.

SLOW-RUNNING DEVICE, 1911 (Models D, E. and F, Fig. 27). This device was practically the same as the previous one, with the exception that the dip tube, instead of being a fixture, was made telescopic, and the slow-running was adjusted by sliding the outer tube up or down. To draw up more petrol the tube was lengthened, and to weaken the mixture *vice versa*.

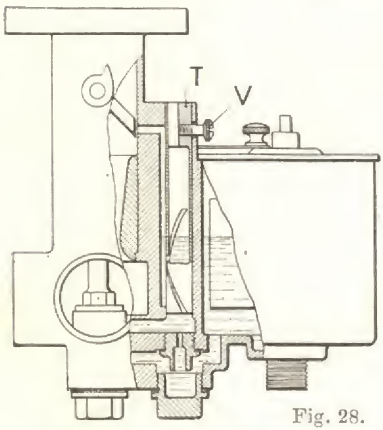
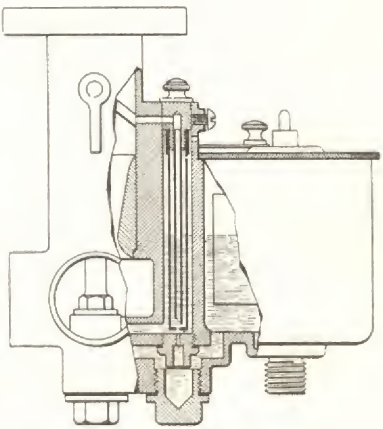


Fig. 28.

SLOW-RUNNING DEVICE 1912 (Fig. 28).—This device was more practical as the point from which the petrol was drawn was made adjustable from the outside. This adjustment was obtained by turning, by means of the screw V, the tube T, in which a helix was cut, against a vertical groove in the body of the Carburetter. By moving the screw V away from the float chamber the mixture was enriched and *vice versa*.

SLOW-RUNNING DEVICE, 1913. M.P. Tube (Fig. 29).—This system, which was adopted during the year 1913, was regulated by taking out one tube and replacing it by another having a different size petrol hole. Each tube is drilled in two places; right underneath is the hole for the petrol and on the side higher up is a hole for the air to enter. The sizes of these holes are stamped against them.



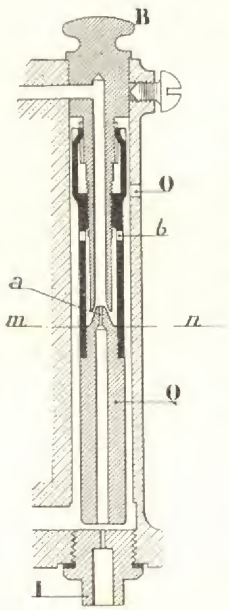
Slow-running device M.P. 1913.

Fig. 29.

If starting is difficult and the engine stops after several revolutions, another tube must be fitted having a larger petrol hole, but a smaller petrol hole is necessary if, after easy starting, the engine runs jerkily or hunts.

SLOW-RUNNING DEVICE, 1914 and 1915.—This device, called Tube R, is fitted to both the **horizontal** and **vertical** Carburetters, and a section of each is given on the next page.

The adjustment is effected, in the case of the **vertical** Carburetters (Fig. 30), by merely turning the part Q. When the Carburetter is fitted and before starting up, screw the part Q right home until a resistance is felt. This means that the male cone *a* is touching the female cone of the part B. Then unscrew one turn, replace the slow-running tube and tighten the set screw.



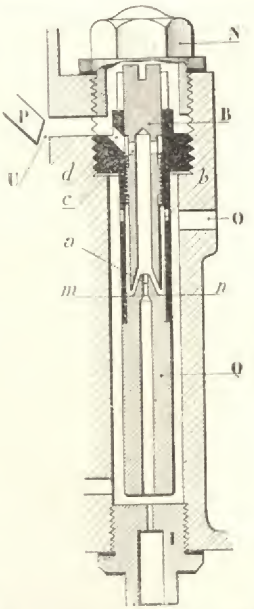
Slow-running device R 1914 and 1915 (vertical carburetters ABC—DEF)

Fig. 30.

Two things may happen:

1.—Starting is impossible or the engine gives one or two explosions and then stops. In this case take out the whole device, screw up the part Q slightly, replace and try again. Keep on screwing up by one notch at a time until the starting is easy and the engine does not stop.

2. The engine starts very easily and keeps on running, but commences to run jerkily and gradually gets worse. This indicates an excess of petrol, which is remedied by slightly unscrewing the part Q.



Slow-running device R 1914 and 1915 (horizontal carburetters H—H A)

Fig. 31.

For the **horizontal** Carburetters it is only necessary to remove the plug N, screw the part B home by means of a screwdriver, then unscrew it one turn. The engine is then started up, and according to the symptoms of too rich or too poor a mixture so the part B is very slightly unscrewed or screwed up.

A FEW CAUSES OF BAD RUNNING.

Let us suppose for the study of these various causes that the fitting and tests have been in strict accordance with our instructions set out herein.

PETROL DRIPS FROM THE CARBURETTER.— The car being at a standstill the level in the float chamber drops although the petrol pipe is quite tight; or else petrol falls, drip by drip, from the Carburetter. The cause is that the float-chamber **is out of adjustment**, the **float perforated**, the **pressure in the petrol tank is too high**, or there is dirt on the needle seating, which should be cleaned.

MOMENTARY DRIPPING OF PETROL.—If, when the engine is stopped, petrol drips from the Carburetter for several minutes, and then ceases, this is caused by condensation of petrol vapour in the induction pipe owing to **insufficient heating**, or to the internal diameter of the inlet pipe, where it joins the Carburetter, being too large.

DIFFICULTY IN STARTING.—This may be owing to several causes.

1. Slow-running tube stopped up.
2. Plug points too far apart.
3. Ignition lever badly placed.

On cars with variable ignition there is generally a favourable position for easy starting. The person who is continually using a car soon gets to know this position.

For starting up in **very cold weather**, although in principle it is useless to flood the Carburetter, the excess of petrol thus obtained often makes the starting easier.

POPPING-BACK IN THE CARBURETTER AT SPEED, NO MATTER WHAT SIZE OF JET BE USED.—Two things may be the cause of this :—

1. **The float chamber empties**, owing to the supply of petrol being inadequate. In this case the popping-back occurs after running for a certain time at speed whether the engine is hot or cold.

2. **Pre-ignition**. In this case, as above, the popping-back occurs after running for a certain time at speed, but only when the engine is very hot. This would not occur during the first half-hour or so.

HESITATION WHEN CHANGING DOWN.—This hesitation occurs chiefly when a car is climbing a hill and the clutch is withdrawn in order to change down to a lower gear, the engine also hunts.

This is **always** a sure sign **of insufficient heating**, and sometimes of **too large a compensator also.**